

Remarks

Claims 1-33 are pending. Claims 1-6 and 10-33 stand rejected. Claims 7-9 stand objected to. Claims 2, 18, and 23 are canceled by the present amendment. Accordingly, claims 1, 3-17, 19-22, and 24-33 are at issue. Further examination or reconsideration is requested.

As a preliminary matter, it should be noted that many of the claims have been amended such that some occurrences of the “coefficients” have been changed to “samples.” Such amendments are not made in response to any rejection based on the prior art, and are instead intended to clarify the claim language without substantively changing the scope of the claims. In particular, the specification typically refers to the circular shift as being “m samples,” not “m coefficients.”

Claims 1, 2, 17, 18, and 21-23 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Mazzoni et al., U.S. Pub. No. 2004/0151110, in view of admitted prior art. Applicants respectfully traverse the rejection with regard to claims 1, 17, and 21-22. Claims 2, 18, and 23 are canceled.

Claim 1, as presently amended, recites that the Inverse Fast Fourier Transform circuit itself is adapted to circularly shift the input data by m samples. Mazzoni does not teach or disclose such an Inverse Fast Fourier Transform circuit. In contrast, Mazzoni teaches adding a multiplier (ref. numeral 22) to multiply inputs to the IFFT by a coefficient e^{jK_i} to achieve rotation. As explained in the present invention, modifying the IFFT circuit to perform a circular shift is advantageous as compared to adding a multiplier to multiply inputs by rotator coefficients because a modified IFFT avoids the complexity of a multiplier and, if done as described according to the present invention, would not add to the complexity of the IFFT circuit. See, Application, Paragraph 0052 (“the IFFT 208 may be modified (without increasing complexity), and the Rotator Coefficient 206, and Multiplier 202 may be eliminated in order to obtain a circularly shifted output”). Because Mazzoni and the prior art described in the present application fail to disclose all of the elements of claim 1, claim 1 as presently amended is believed allowable.

Regarding Claim 17, that claim is presently amended to recite that the input data samples for the Inverse Fast Fourier Transform are not multiplied by rotator coefficients. Similarly, regarding claim 22, that claim is amended to recite performing a circularly rotated Inverse Fast Fourier Transform on frequency domain information to generate time domain information without multiplying input samples by rotator coefficients. As set forth above with respect to claim 1, Mazzoni does not disclose

an IFFT that achieves a circular shift of output samples without modifying the IFFT inputs by multiplying them by rotator coefficients. Accordingly, claims 17 and 22 are believed allowable. Additionally, claim 21, which depends from claim 17, is believed allowable for the same reason as claim 17.

Claim 3 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Mazzoni in view of admitted prior art and further in view of Walton et al., U.S. Pub. No. 2004/0081131. Applicants respectfully traverse the rejection.

Claim 3 depends from claim 1 and is believed allowable for the same reason as claim 1, that is, neither Mazzoni nor the prior art identified in the application teaches or discloses an Inverse Fast Fourier Transform circuit that is itself adapted to circularly shift the input data by m samples. Walton does not fill the gaps in Mazzoni. Accordingly, claim 3 is believed allowable.

Claims 4, 5, and 6 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Mazzoni in view of admitted prior art, further in view of Walton, and further in view of Yeh, U.S. Pub. No. 2004/0059766. Applicants respectfully traverse the rejection.

Claims 4, 5 and 6 depend from claim 1, and therefore include all of the limitations of claim 1 and are believed allowable for the same reasons as independent claim 1. The remarks with respect to claim 1 are incorporated herein by reference.

Additionally, claim 4, as amended, recites that the Inverse Fast Fourier Transform is adapted to circularly shift the input data by m samples by modifying the memory contents for multiplier circuits with memory and modifying the control for rotator circuits. Claim 5 recites the Inverse Fast Fourier Transform is adapted to circularly shift the input data by m samples by modifying the control for the first rotator circuit and memory contents of the first multiplier circuit with memory. As set forth above, neither Mazzoni, Walton, nor the prior art disclosed in the present application teach or suggest modifying an IFFT to circularly shift the data by m samples. Accordingly, neither Mazzoni, Walton, nor the prior art disclosed in the present application, can teach or suggest the specific ways that the IFFT is modified as recited in claims 4 and 5, i.e., by modifying the memory contents for multiplier circuits with memory and modifying the control for rotator circuits (claim 4) or by modifying the control for the first rotator circuit and memory contents of the first multiplier circuit with memory (claim 5). Yeh also fails to disclose modifying an IFFT to achieve a circular shift, and therefore also fails to fill the gaps in Mazzoni and Walton and the prior art disclosed in the application.

Claim 6 recites another configuration of the IFFT to effect a circular shift of the output of the Inverse Fast Fourier Transform circuit by m samples. In particular, claim 6 recites a control circuit configured to modify the control to the rotator circuit and to selectively control the plurality of butterfly circuits whether the addition operation or the subtraction operation is output first in time. As set forth above, the cited passages of the cited references do not disclose such structure.

Accordingly, claims 4, 5 and 6 are believed allowable for these additional reasons.

Claims 19, 20, 24 and 25 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Mazzoni in view of admitted prior art and further in view of Yeh. Applicants respectfully traverse the rejection.

It should be noted that claims 19, 20, 24 and 25 are amended to correct informalities concerning antecedent basis. The amendments are not made in response to any rejection based on asserted prior art.

Claims 19 and 20 depend from claim 17, and therefore include all of the limitations of claim 17 and are believed allowable for the same reasons as independent claim 17. The remarks with respect to claim 17 as set forth above are incorporated herein by reference.

Claims 24 and 25 depend from claim 22, and therefore include all of the limitations of claim 22 and are believed allowable for the same reasons as independent claim 22. The remarks with respect to claim 22 as set forth above are incorporated herein by reference.

Claim 19 recites that the means for performing a circularly rotated Inverse Fast Fourier Transform further comprises a means for modifying a control for the first rotator circuit and memory contents of the first multiplier circuit with memory. As set forth above, neither Mazzoni, nor the prior art disclosed in the present application, nor Yeh teach or suggest a means for performing a circularly rotated Inverse Fast Fourier Transform that includes modifying an IFFT to circularly rotate the data. Accordingly, neither Mazzoni, nor the prior art disclosed in the present application, nor Yeh can teach or suggest the specific ways that the IFFT is modified as recited in claim 19, i.e., modifying a control for the first rotator circuit and memory contents of the first multiplier circuit with memory. Claim 24 is believed patentable for similar reasons.

Claim 20 recites that the means for performing a circularly rotated Inverse Fast Fourier Transform further comprises a means for modifying the order of the contents of the memory and modifying the control circuit to modify the control of the rotator circuits and butterfly circuits. As set

forth above, neither Mazzoni, nor the prior art disclosed in the present application, nor Yeh teach or suggest a means for performing a circularly rotated Inverse Fast Fourier Transform that includes modifying an IFFT to circularly rotate the data. Accordingly, neither Mazzoni, nor the prior art disclosed in the present application, nor Yeh can teach or suggest the specific ways that the IFFT is modified as recited in claim 19, i.e., by modifying the order of the contents of the memory and modifying the control circuit to modify the control of the rotator circuits and butterfly circuits. Claim 25 is believed patentable for similar reasons.

Claims 26-33 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Yeh in view of Mazzoni. Applicants respectfully traverse the rejection.

Claim 26 claims, inter alia, that the output of the transform circuit is circularly shifted by m samples by modifying the control to a first stage rotator circuit and modifying the memory contents of the multiplier circuit. Claim 30 claims, inter alia, that the output of the transform circuit is circularly shifted by m samples by modifying the control to the butterfly circuit, modifying the control to the rotator circuit and re-ordering the memory contents of the multiplier circuit. As set forth above, Yeh and Mazzoni do not teach or suggest such structure. In particular, Mazzoni appears to rely on an external multiplier to multiply inputs to the IFFT by rotator coefficients. Yeh, on the other hand, appears to re-order data using a “reordering circuit 1100,” which is disclosed as a dual port RAM, to change the order of samples. Neither Mazzoni nor Yeh teach or disclose modifying a transform circuit to achieve a circular shift. Accordingly, claims 26 and 30, and the claims that depend therefrom, are believed allowable over those published applications.

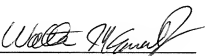
Claims 13-16 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Yeh in view of Mazzoni and further in view of the prior art disclosed in the present application. Applicants respectfully traverse the rejection.

Claim 13, as presently amended, recites that the Inverse Fast Fourier Transform circuit has a length of N samples, where N is a power of 2 and the N samples are not multiplied by rotator coefficients, and that the IFFT is configured to circularly shift output information by m samples. As set forth above, this distinguishes claim 13 over Yeh and Mazzoni because neither Yeh, Mazzoni nor the prior art disclosed in the present application teach or suggest configuring an IFFT to circularly shift data by m samples without multiplying the IFFT inputs by rotator coefficients. Accordingly, claim 13, and claims 14-16, which depend from claim 13, are believed allowable over the cited references.

In view of the foregoing remarks, it is respectfully submitted that the present application is now in condition for allowance. Favorable reconsideration and allowance of the present application are respectfully requested.

The Commissioner is hereby authorized to charge any additional fee which may be required for this application under 37 C.F.R. §§ 1.16-1.18, including but not limited to the issue fee, or credit any overpayment, to Deposit Account No. 23-0920. Should no proper amount be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal, or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 23-0920.

Respectfully submitted,
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September 17, 2007

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